

Claims

We claim:

- 1 1. A method for scheduling a plurality of series of packets for transmission
2 between a plurality of terminals in a single wireless channel of a packet-
3 switched local area network, comprising:
4 assigning a transmission rate to each of a plurality of terminals; and
5 scheduling the series of packets for transmission between the
6 terminals such that each terminal receives a substantially equal amount of
7 transmission time over an extended period of time.
- 1 2. The method of claim 1, in which the local area network operate in an ad
2 hoc mode.
- 1 3. The method of claim 1, in which the local area network operates is in an
2 infrastructure mode.
- 1 4. The method of claim 1, further comprising:
2 assigning different transmission rates to the plurality of terminals such
3 that at least one terminal is transmitting at a different rate than all other
4 terminals.
- 1 5. The method of claim 1, in which some of the plurality of terminals are
2 mobile.

1 6. The method of claim 1, in which the assigned transmission rate is
2 dependent on a quality of the channel.

1 7. The method of claim 6, in which a particular terminal transmitting via an
2 error-free channels is assigned a higher transmission rate than another
3 terminal transmitting via an error-prone channel.

1 8. The method of claim 1, further comprising:

2 assigning a start tag $S_k^f = \max\{V(A(t_k^f)), F_{k-1}^f\}$ and a finish tag
3 $F_k^f = S_k^f + L_p / (r_f \bullet C_f(t))$ to each packet, where k sequence number of
4 the packet, in a particular series of packets f , $A(t_k^f)$ is an arrival time of the
5 packet, L_p is a size of the packet in bits, $V(.)$ is a virtual time for the start
6 tag, and r_f is a base transmission rate, and $C_f(t)$ is a current transmission
7 rate.

1 9. The method of claim 8, further comprising:

2 normalizing the current transmission rate with respect to the base
3 transmission rate.

1 10. The method of claim 8, further comprising:

2 scheduling the particular packet with a smallest start tag to transmit
3 first.

1 11. The method of claim 1, further comprising:
2 associating a credit counter with each series of packets f such that
3 when $E_f(t) > 0$ the series of packets is leading, and when $E_f(t) < 0$ the series
4 of packets is lagging, where t is a time unit.

1 12. The method of claim 11, further comprising:
2 increment the credit counter for a particular leading series of packets
3 by the number of time units relinquished by a particular lagging series of
4 packets while decrementing the credit counter of the particular lagging series
5 of packets by the number of time units.

1 13. The method of claim 12, in which the time units are expressed in terms
2 of transmitted bytes, normalized with respect to the transmission rate.

1 14. The method of claim 12, further comprising:
2 relinquishing time units from a selected leading series of packets
3 having a maximum credit counter to lagging series of packets.

1 15. The method of claim 14, in which the time units are relinquished to the
2 lagging series of packets proportional to normalized credit counters of the
3 lagging series of packets.

1 16. The method of claim 1, further comprising:
2 estimating a state of the channel in each terminal to determine
3 whether the terminal schedules packets for transmission.

1 17. The method of claim 1, in which scheduling mechanism is implemented
2 with a hybrid coordinator according to an IEEE 802.11e standard.

1 18. A system for scheduling a plurality of series of packets for transmission
2 between a plurality of terminals in a single wireless channel of a packet-
3 switched local area network, comprising:

4 an error-free service model configured to define ideal packet flows
5 that transmit at different rates over an error-free channel;

6 a lead and lag model configured to determine leading packet flows
7 and lagging packet flows, and to determine amounts of leading and amounts
8 of lagging for the leading packet flows and the lagging packet flows,
9 respectively; and

10 a compensation model configured to compensate the lagging packet
11 flows at an expense of the leading packet flows; and

12 means for scheduling the series of packets for transmission between
13 the terminals such that each terminal receives a substantially equal amount
14 of transmission time over an extended period of time.

1 19. The system of claim 18, further comprising:

2 a channel estimation module; and

3 a channel access module.

1 20. A system for scheduling a plurality of series of packets for transmission
2 between a plurality of terminals in a single wireless channel of a packet-
3 switched local area network, comprising:

4 means for assigning a transmission rate to each of a plurality of
5 terminals; and

6 means for scheduling the series of packets for transmission between
7 the terminals such that each terminal receives a substantially equal amount
8 of transmission time over an extended period of time.